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A QUICK-CHANGE SACKING ATTACHMENT FOR HARVESTING COTTON RESEARCH PLOTS[1/]

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Most cotton research plots should be harvested mechanically because mechanization is directly or indirectly related to most phases of cotton production. Expanded cotton research and the shortage of hand labor have made this a near necessity.

Standard cotton harvesters can be used for harvesting plots. However, separate handling, weighing, and sampling of small amounts of cotton from plots pose problems, because the cotton must be collected from the basket, weighed, and sampled. A sacking attachment for the harvester simplifies the process.

Cotton research scientists and engineers have made several types of harvesting aids. Smith and Brown[4/] developed a sacking attachment with a valve in the picker air-conveyance duct. This valve could be switched to direct the cotton through a short duct to a sack hooked on the opposite end of the duct. This duct and the sacking station were located outside the basket.

The attachment with the valve closed did not interfere with operation of the picker for general picking. Carter, Colwick, and Little[5/] developed a portable seed cotton scale trailer for research plots. This device was developed for weighing cotton from large plots harvested by a conventional

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1/ A cooperative study by Agricultural Research Service and Auburn University Experiment Station--a part of a contributing project to Regional Project S-2.

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4/ Smith, H. P., and Brown, E. C., Jr. Cotton picker sacking attachment for harvesting small plots. Agr. Engin. 34(4): 234. 1953.

5/ Carter, L. M., Colwick, R. F., and Little, D. E. A portable seed cotton scale trailer for research plots. U.S. Agr. Res. Ser., ARS 42-63, 8 pp. February 1962.

picker. Clayton, Holstun, and Wooten[6/] developed two models of mechanical picker attachments for harvesting research plots. One of these was placed inside the cotton picker basket with the top removed. It had a shielded duct to direct trash away from the operators and a sacking turntable to hold four sacks. This turntable permitted plot harvesting with very little time lost between plots. The other model was built on a platform which replaced the basket. It had a duct system with a two-way valve mounted on a platform to give more room for the operator and sample bags than was available on the turntable model. Brashears and Ray[7/] developed a cotton stripper for harvesting research plots. This machine had a conventional brush-rubber paddle stripper head with a special conveyor arrangement for sacking two rows separately or together or for directing the harvested cotton into a drawn trailer. Brown and Turner[8/] developed an attachment for rapid harvesting of test plots. This device consisted of an elbow duct and a weighing basket suspended on a scale in the basket of a picker.

All these plot-harvesting aids reduce the time required for harvesting small plots. However, they each require 40 minutes or longer to install and remove each time the picker is needed for general harvesting. Installation of some of these units requires a hoist or forklift. The harvest timing of small plots and larger fields at different times is difficult to arrange because of time of crop maturity. Plot and field harvesting is intermingled at many experiment stations to make the best use of time, labor, and equipment. Preparation of the picker for plot harvesting and its conversion then back for field harvesting may require more time than is justified. A sacking attachment that would not interfere with general harvesting or that could be installed and removed from the harvester quickly would alleviate the disadvantage of alternating from plot to field harvesting. The plot sacker developed by Smith and Brown in 1952 met these requirements; however, picker conveyance systems have been redesigned and their sacker cannot be used with new-model pickers. A sacking attachment for a mechanical picker was developed at the Alabama Agricultural Experiment Station in 1966 that makes the harvester readily convertible to either plot or field harvesting.

DESCRIPTION

The plot sacking attachment (figs. 1 and 2) was mounted inside the basket at the discharge of the pneumatic conveyance system. Two brackets to support the attachment were attached to the picker basket (figs. 2 and 3). These brackets remain on the picker and do not interfere with operation of the machine for general harvesting.

6/ Clayton, J. E., Holstun, J. T., Jr., and Wooten, O. B. Two mechanical-picker attachments for harvesting cotton research plots. U.S. Agr. Res. Ser., ARS 42-90, 11 pp. October 1963.

7/ Brashears, A. D., and Ray, L. L. Cotton stripper for harvesting research plots. U.S. Agr. Res. Ser., ARS 42-122, 5 pp. August 1966.

8/ Brown, C. M., and Turner, J. H. A new attachment for harvesting of small cotton plots with conventional spindle pickers. Crop Sci. 6:607-608. November-December 1966.

Figure 1. Plot sacking attachment.

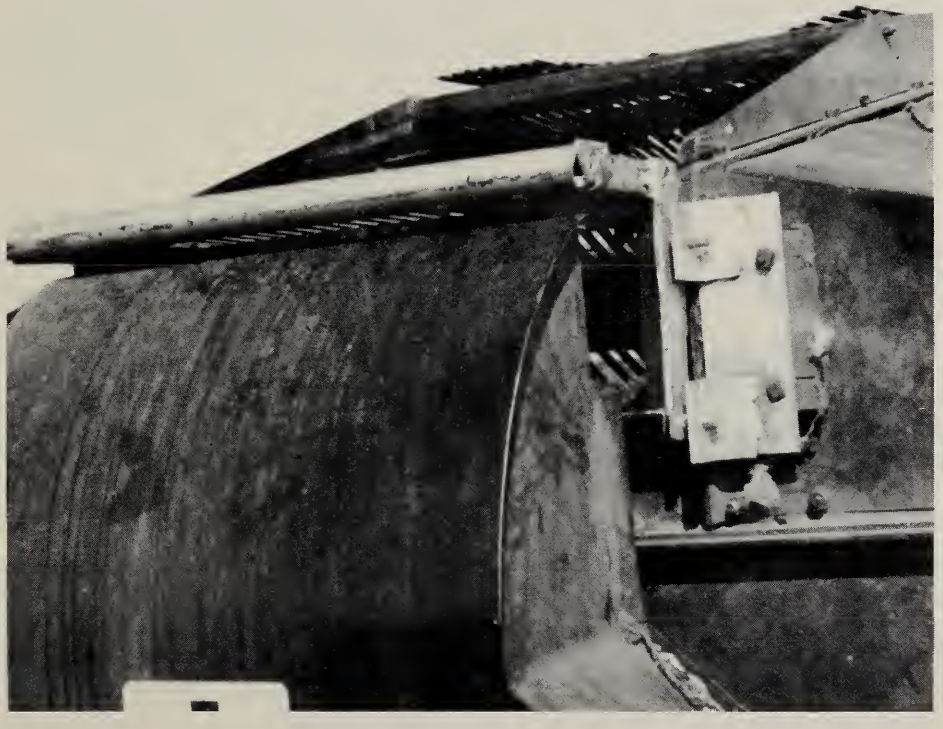


Figure 2. Plot sacking attachment mounted in picker basket, showing location of right-hand mounting bracket. (Note: A spacer block was used under the mounting bracket to locate the sacking attachment properly.

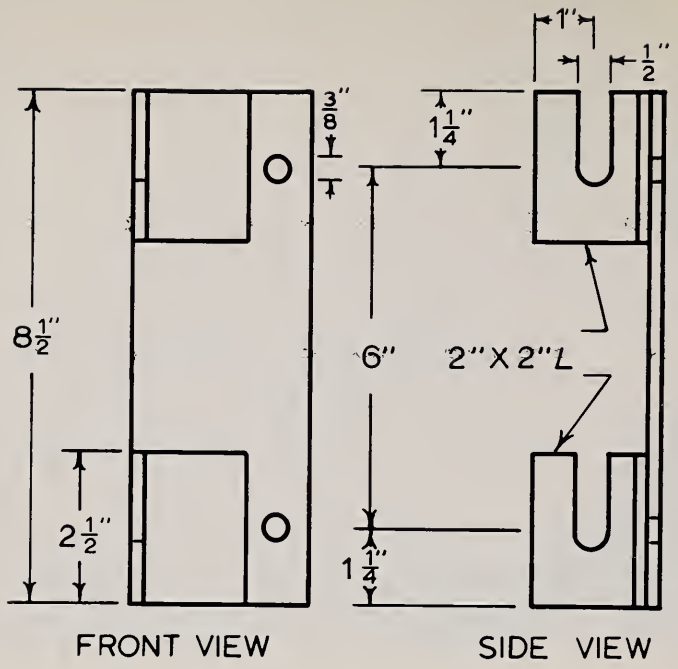


Figure 3. Brackets for mounting sacking attachment in picker basket. (Right-hand bracket shown; left-hand bracket required on other side.)

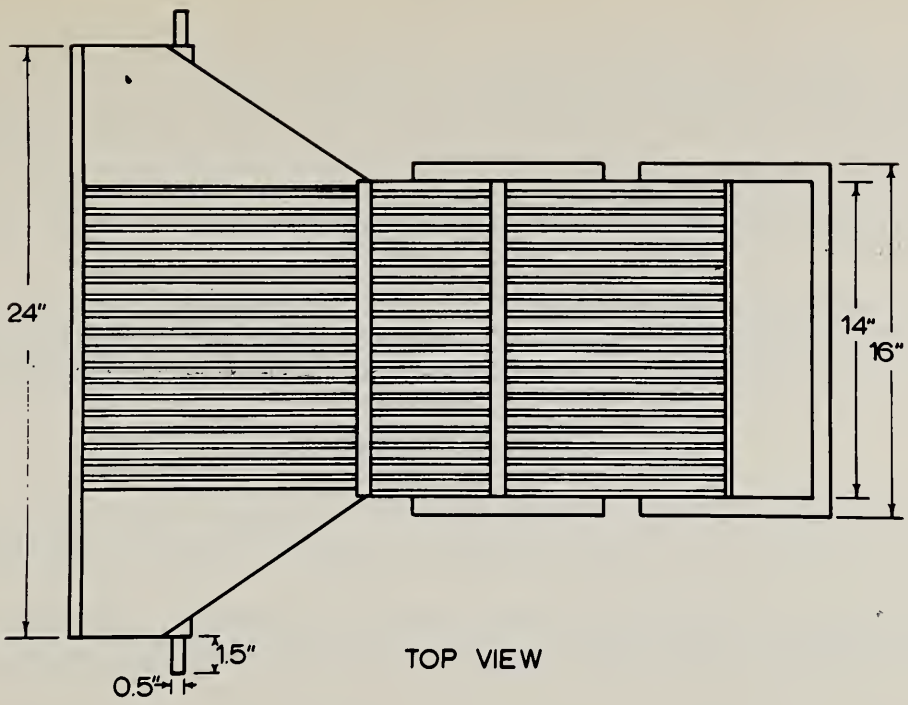
Some construction details of the sacking attachment are shown in figure 4. Sixteen gage sheet metal was used. Three picker-basket grates were used in the top of the sacker to release the conveying air and airborne trash in the harvested cotton. A two-way valve was installed to direct cotton to either of two sacking spouts.

The wire bottom of the picker basket was covered with 1/4-inch plywood flooring before the plot picking attachment was used. This flooring is lightweight but satisfactory for supporting the sacker operator inside the basket.

To mount the attachment the operator needs only to swing the cleaning grids at the front of the picker basket out of the way and slide the mounting pins on the sacking attachment into their respective slots on the mounting brackets. The sacking unit as constructed weighed 46 pounds. Therefore, one man can mount or remove the unit quickly.

The sacking attachment was made to fit an IHC 501 one-row cotton picker.[9/] This design could also be used on other pickers with minor modifications of the sacker opening and mounting brackets.

9/ Trade names are used in this publication solely for the purpose of providing specific information. Mention of a trade name does not constitute a guarantee or warranty of the product by the U.S. Department of Agriculture or an endorsement by the Department over other products not mentioned.



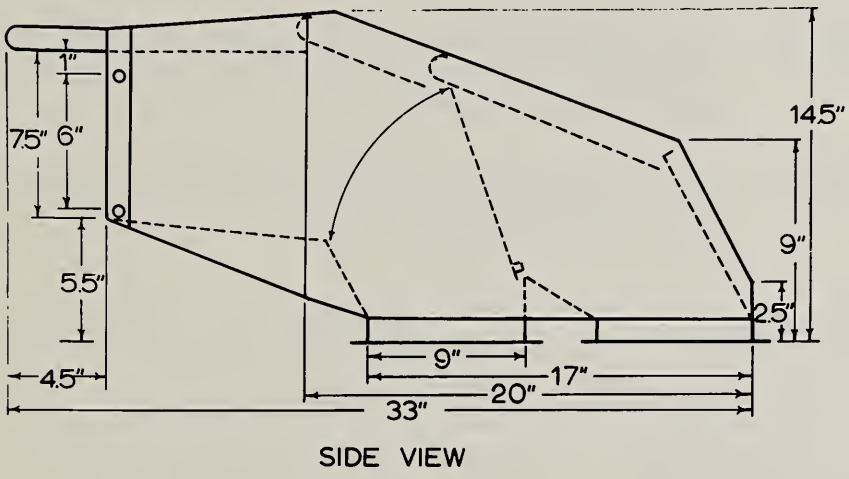


Figure 4. Plot sacking attachment for harvesting research plots.

OPERATION

The plot-harvesting crew used with this sacking attachment consisted of a picker operator, a sacker operator, and a supervisor. The sacker operator, stationed inside the picker basket, placed a 30- by 40-inch burlap sack on the discharge spout, and a plot was harvested. The supervisor then gave the sacker a plot tag to identify the sack which was then tied and placed in the back of the basket. About twenty-five 0.005-acre plots (65 row-feet) could be harvested before the sacks needed to be removed from the basket. If plots were too large for one bag to hold all the cotton, two bags were installed and the two-way

valve was switched from the full to the empty bag without interrupting the operation of the picker.

The plot-harvesting operation may be speeded considerably by prenumbering and arranging plot bags in the sequence in which the plots will be harvested. The two sacking spouts are used alternately, with the sacker operator handling and tying the previously harvested plot bag and putting on a new bag while another plot is being harvested. When the next plot is reached, it is only necessary to switch the valve to the empty sack.

Clayton, Holstun, and Wooten[10/] give several suggestions on plot layout and harvesting procedures. These, or other procedures adapted to a particular test, may be used as required to improve plot-harvesting techniques.

EVALUATION

A time-and-motion study of plot-harvesting operations was made to determine the time and labor savings possible by use of the plot sacking attachment.

The time required for harvesting the plot, handling the sack between plots, and turning in alleys was recorded for 25 plots with each of three methods:

Method 1. One man sacking the harvested cotton with the sacking attachment.

Method 2. One man gathering and sacking the cotton in the basket between plots, without use of the sacking attachment.

Method 3. Two men gathering and sacking the cotton in the basket between plots, without use of the sacking attachment.

There was a highly significant difference in sacking and handling time between the havesting of plots by the three methods. The total time required per plot was 44.3, 144.6, and 76.0 seconds for methods 1, 2, and 3, respectively. The overall harvesting rate for 0.005-acre plots was 49, 20, and 33 plots per hour for methods 1, 2, and 3, respectively. With the same labor force, the plot harvesting rate was more than doubled by using the sacking attachment.

The labor cost per plot with the sacking attachment was less than half that required for either of the other two methods. Two men were able to install or remove the sacking attachment in less than one minute.

10/ See footnote 6, p. 2.

SUMMARY

The quick-change sacking attachment for a mechanical cotton picker facilitates mechanical harvesting of small research plots and permits rapid conversion of the harvester between plot harvesting and general field harvesting.

This attachment should prove useful at research stations where a mechanical picker must be used interchangeably for plot harvesting and general harvesting.

A minimum amount of labor is required for harvesting research plots mechanically. Research results are more applicable to commercial production operations when plots are harvested mechanically.

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